Appendix C

This appendix contains over 600 reports (approximately 3,100 pages) that are available upon request and may be subject to a reproduction fee. To request a copy of these documents contact 608-266-2141.

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Wisconsin Department of Natural Resources

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Chronic Wasting Disease in Wisconsin and the 2002 Hunting Season:

Gun Deer Hunters' First Response

by

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April 2003

This study was funded through Federal Aide in Wildlife Restoration Act dollars derived from the purchase of hunting equipment

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EXECUTIVE SUMMARY

The discovery of chronic wasting disease (CWD) in Wisconsin posed an immediate threat to both the deer herd and the state's hunting tradition. Hunters and wildlife professionals were alarmed; licenses sales dropped. Despite the significance of the disease and its 30-year presence in Western herds, no studies have been published on its actual or potential social and economic impacts. This study fills that gap. It is the first study in the nation that takes an in-depth look at the deer hunters' response to chronic wasting disease. Will hunters, for example, react by withdrawing from the sport? Will hunters adapt to the disease, perhaps changing where they hunt and what they do with the deer they bag? This study examines these and related issues.

The data on which this study is based come from a mailed questionnaire of Wisconsin's gun deer hunters. At the close of the 2002 9-day gun deer hunt, questionnaires were mailed to 2,100 resident gun deer hunters. Respondents included those who hunted in counties that contained CWD management units and those counties where the disease had not been detected. After four contacts and eliminating non-deliverable questionnaires, 68 percent of those contacted completed and returned the questionnaire.

Readers should understand that the study was conducted after the traditional gun deer hunt for most respondents, though not necessarily for all CWD county respondents, and before any CWD test results were known. Further, these results represent initial findings. The data will continue to be examined for other helpful findings in the future.

Definitions

This report makes frequent reference to CWD counties (or area), outstate counties (or area) and north and south regions of the state. For clarity, these are defined in the following ways:

CWD county (or area): All counties in the state that contain at least part of a deer management unit that lies within the CWD Management Zone (see Appendix A).

Outstate counties (or area): All other counties in the state; those that do not contain any deer management units where CWD is present (see Appendix A).

North and South: A county was determined to be north or south based on where the majority of the county fell relative to being north or south of Highway 29.

Study Highlights

To anticipate the detailed findings, study highlights include:

- Despite all the controversy and concern, the behavior of hunters has been remarkably constant; most continued to hunt and most will continue to hunt unless CWD reaches epidemic proportions in the herd. The data suggest that if the disease was left unchecked so that it reached epidemic proportions hunters would begin to abandon the sport.

- Hunters from CWD counties were slightly more likely to skip the 2002 gun season than were hunters from non-CWD counties.

- CWD was not the primary reason most hunters chose not to deer hunt in 2002. Two-thirds (68%) of past hunters had reasons other than CWD for not hunting.

- CWD was only one of many risks that hunters faced when they went hunting. More hunters were concerned about being shot by a hunter from another hunting party than becoming ill from CWD. Further, hunters were no more concerned about becoming ill from CWD than they were about contracting Lyme's disease.

- The majority of hunters did not change their hunting behavior, that is, they did not change where they hunted or how long they hunted. Also, nearly all hunters that bagged a deer had the deer processed for consumption of its venison.

- Hunters endorsed further monitoring of the deer herd more so than any other proposed control measure. Two-thirds (68%) of all hunters thought the Department of Natural Resources (DNR) should continue its monitoring and wait for all test results before proceeding with disease control measures.

- There was moderate support for a statewide ban on deer baiting. In the north, just over one-half (52%) supported a statewide ban on deer baiting. Nearly two-thirds (64%) of hunters from the south supported the ban.

- Hunters from the north were less likely than hunters from the south to support a statewide ban on deer feeding. Less than one-half (48%) of hunters from the north supported a statewide ban on deer feeding; more than one-half (56%) of hunters from the south supported the ban.

- One-half or more of all hunters said they paid "a lot" of attention to news about chronic wasting disease.

- A majority of hunters said the DNR provided truthful information about CWD, but only a minority trusted the DNR to make good deer management decisions regarding CWD.

- On a four-point grading scale where an "A" equals four and an "F" fails, hunters gave the Department a mean grade of 2.5, equivalent to a "B/C," for the job it's done handling CWD.

Sampling, Data Collection and Analysis

The data presented in this report were drawn from a mailed questionnaire sent to Wisconsin gun deer hunters. A random selection of 2,100 resident gun deer hunters was proportionally drawn from all 2001 licenses that allow a person to gun deer hunt. License records from 2001 were used to explore why a hunter chose not to hunt in 2002. The sampling for this study consisted of two parts:

1,500 resident gun deer hunters were randomly drawn statewide.

To allow disaggregate analyses by CWD counties and non-CWD counties (outstate) an over-sample of 600 resident gun deer hunters was randomly drawn in the CWD counties.

The Questionnaire

The questionnaire used for the study was developed in consultation with personnel from DNR Bureaus of Wildlife Management, Law Enforcement, Legal Services, and Integrated Science Services and the University of Wisconsin-Madison Department of Wildlife Ecology. The resulting 26-page questionnaire was pre-tested on Wisconsin gun deer hunters, revised and then peer reviewed by social scientists with the Human Dimensions Unit at Colorado State University-Fort Collins.

Implementation

Standard mailed questionnaire techniques were used in the conduct of this survey. A maximum of four contacts were made with each hunter. These included an initial questionnaire with a cover letter and a stamped addressed return envelope; a postcard as a "thank you" for returning the questionnaire or as a reminder to please complete and return it; and a second questionnaire with a cover letter and a stamped addressed return envelope to all non-respondents. Former Secretary Darrell Bazzell signed the cover letters and the postcard. A fourth and final contact consisting of a questionnaire with a cover letter (signed by DNR Wildlife Management bureau director Tom Hauge) and a stamped addressed return envelope was sent to all non-respondents. Eliminating the non-deliverables reduced the sample size to 2,053. A useable response rate of 68 percent was reached for each sample.

The University of Wisconsin Survey Center handled the clerical tasks associated with this survey. They assembled the mailings, tracked the response rate and entered the data. The survey was conducted during December 2002 and January 2003. The Christmas and New Year's holidays are generally avoided for survey research. The urgency of the information, however, necessitated the unfortunate timing.

Analysis

The DNR Bureau of Integrated Science Services conducted all analyses using SPSS-PC version 10.0. Data were disaggregated by year 2002 hunting participation (did the respondent gun deer hunt in 2002?) and by county of residence and deer management unit hunted (CWD area versus outstate area). The margin of error for the study is +/- 3 percent.

FUTURE DEER HUNTS IN WISCONSIN

Most hunters will continue to hunt deer unless CWD reaches epidemic proportions in the deer herd.

The questionnaire explored how the behavior of non-CWD area hunters might change as the incidence of CWD in the deer herd increased. These were both simple and complex questions. The table below documents the "simple" behavioral intentions of those hunters. It indicates that as the incidence of CWD increased, the likelihood of abandoning hunting also increased.

Likely actions taken by hunters as CWD increases in prevalence.

	Prevalence of CWD in unit that hunter normally hunts			
Hunter response	**1 deer**	**1%**	**5%**	**20%**
No change – hunt same as usual	44%	33%	18%	10%
Continue to hunt as usual but have deer tested	44	52	53	41
Continue to hunt as usual but not eat the deer	6	6	11	15
Switch to another unit that does not have CWD	0	3	8	11
Unsure	5	4	7	14
Stop deer hunting in Wisconsin	1	2	4	10

(**NOTE:** Results are only for hunters that hunted in non-CWD counties; those that have not experienced a CWD-county hunt.)

Observations: Despite the controversy and concern surrounding CWD, most hunters will continue to hunt unless CWD reaches epidemic proportions in the deer herd.

- If CWD became rampant in their deer unit (an incidence of 20%), it's possible that 10 percent of the deer hunters would stop deer hunting altogether in Wisconsin.

  Up to 90 percent of the hunters would change their hunting behavior in some manner.

- At lower levels of incidence, changes in behavior are less dramatic.

  Hunters that said they would abandon deer hunting ranged from one percent (for an incidence of a single CWD-positive deer) to four percent (for a five percent incidence level).

  At an incidence level of one percent, up to two-thirds (67%) of the hunters would change their hunting behavior in some manner.

ANALYST'S INTERPRETATION: The above finding is consistent with the state's initiative of controlling the spread of chronic wasting disease. If the disease was left unchecked so that it reached epidemic proportions the data suggest that hunters would begin to abandon the sport.

The more complex questions included various scenarios that described conditions that may affect a hunter's decision to hunt deer in Wisconsin in 2003. These conditions included:

- The presence or absence of CWD in the hunter's management unit. (Detected was defined as at least one deer in the management unit tested positive for CWD.)
- The availability of a USDA certified CWD test.
- The legality of baiting in the hunter's management unit.

(At the time the questionnaire was being developed, the availability of in-state testing was still in question and the statewide ban on deer baiting was being reconsidered.)

Each condition included three possible actions a hunter could take:

- Continue to hunt in his/her traditional unit.
- Continue to hunt but move to a new hunting unit.
- Give up deer hunting in Wisconsin for the 2003 season.

Three scenarios are presented here:

Scenario 1: CWD in the hunter's unit has been **DETECTED;** a USDA certified test for CWD is **AVAILABLE**; baiting in the hunter's unit is **LEGAL**

Scenario 2: CWD in the hunter's unit has been **DETECTED**; a USDA certified test for CWD is **AVAILABLE**; baiting in the hunter's unit is **NOT LEGAL**

Scenario 3: CWD in the hunter's unit has been **DETECTED**; a USDA certified test for CWD is **NOT AVAILABLE**; baiting in the hunter's unit is **NOT LEGAL**

The table below indicates that even for the most restrictive scenario (scenario 3: CWD is present, a test is not available, and baiting is not legal) most hunters will continue to hunt in their traditional deer management units.

Percent of hunters that is likely to take various actions under different scenarios

	Percent of hunters that are likely to take the following actions		
Scenario	**Continue to hunt in traditional unit in 2003**	**Continue to hunt but switch to new unit in 2003**	**Give up deer hunting for 2003 season**
Scenario 1	84%	12%	5%
Scenario 2	84%	13%	5%
Scenario 3	70%	17%	9%

(**NOTE:** Results are only for hunters that hunted in non-CWD counties; those that have not experienced a CWD-county hunt.)

Observations: The vast majority of deer hunters will continue to hunt even when faced with adverse conditions.

- Results show the high level of commitment hunters have towards deer hunting.

  The majority (70%) of hunters will continue to hunt their traditional units even when CWD has been found in the unit, a test for the disease is not available and baiting is not allowed.

  Less than one hunter in 10 (9%) said s/he would give up deer hunting in 2003 under the above conditions.

- The legality of baiting had little to do with a hunter's decision to hunt.

  No differences were found in the hunters' behavior when the legality of baiting was manipulated (scenarios 1 and 2).

  North and south hunters did not differ in their likelihood of taking any of the various actions.

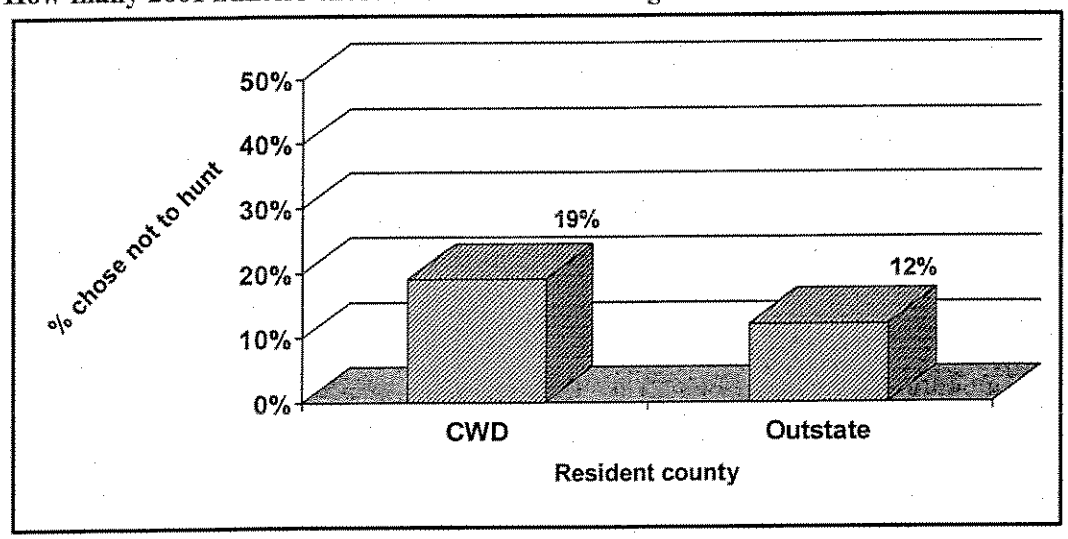
NOTE: A more detailed analysis of the three scenarios is presented in Appendix B.

HUNTERS FROM 2001 THAT CHOSE NOT TO HUNT IN 2002

Hunters from CWD counties were slightly more likely not to hunt than were hunters from non-CWD counties.

This section presents information on how many hunters from 2001 decided not to gun hunt the 2002 deer seasons. It further explains why hunters chose not to hunt.

How many 2001 hunters chose not to hunt the 2002 gun seasons?



Observations: Hunters from the CWD counties were somewhat more likely to abandon hunting in 2002 than were hunters from non-CWD counties.

- About one hunter in five (19%) residing in the CWD counties chose not to gun deer hunt in 2002.
- Slightly more than one hunter in 10 (12%) in all other counties chose not to gun deer hunt in 2002.

NOTE: The outstate non-hunting rate mirrors past years. During the 2000 and 2001 gun deer seasons, statewide 10 – 12% of the hunters who hunted the previous season did not hunt the current season.

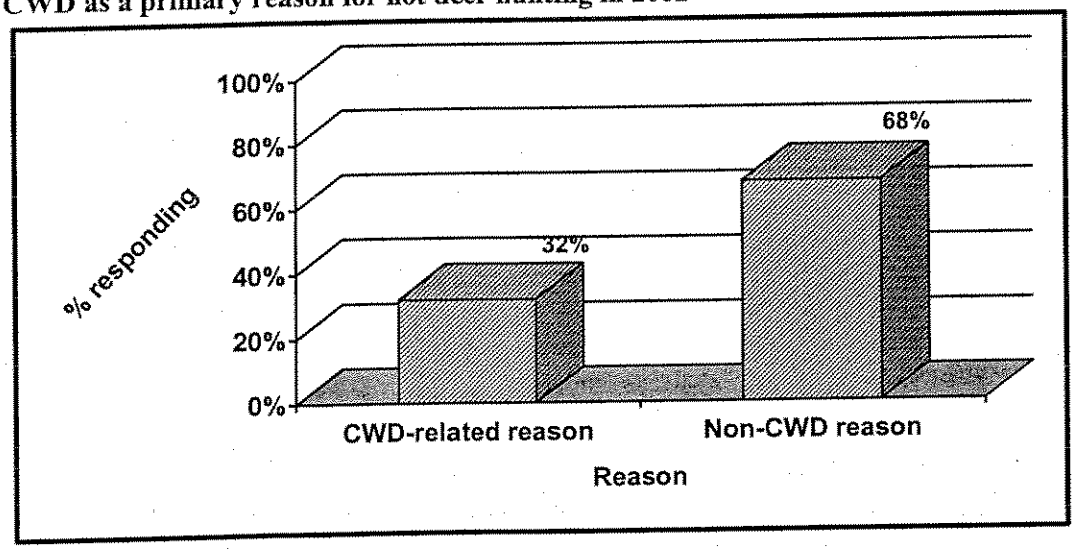
Most hunters chose not to hunt the 2002 gun deer season for reasons other than CWD.

The questionnaire presented 14 possible reasons why past deer hunters chose not to hunt the 2002 gun deer season. A factor analysis of those reasons disclosed that a hunter's decision not to gun deer hunt fell into one of six possible categories. These include:

Concerns about CWD
Personal conflicts and not enough available time
Poor health and advancing age
Lack of hunting partners
Disagreement with DNR deer management policies
Other reasons

The chart below illustrates the affect CWD had on past hunters' decision to hunt in 2002.

CWD as a primary reason for not deer hunting in 2002



Observations: CWD was not the primary reason most hunters chose not to deer hunt in 2002.

- One-third (32%) of past hunters said CWD concerns were the main reasons why they did not deer hunt in 2002.
- They were far more likely to mention scheduling conflicts, poor health and old age, lack of hunting companions, disagreement with DNR policies, and other reasons for not deer hunting in 2002.

NOTE: A more detailed analysis of primary reasons for not hunting can be found in Appendix C.

HUNTERS' PERCEPTION OF RISK

CWD is only one of many risks that hunters face.

The questionnaire asked respondents how concerned they were about numerous hunting-related risks. Do hunters believe CWD is a greater risk to their health than other hunting-related risks? To anticipate, survey results indicate that CWD is just one of many risks hunters faced when they went hunting.

Hunters' perception of risk (percent "very" or "somewhat" concerned)

Potential risk	CWD counties	Outstate
Shot by another party member	50%	47%
Become ill from CWD	**38**	**35**
Contract Lyme's disease	38	34
Shot by own party member	31	21
Fall from tree stand	24	21
Heart attack	19	19
Auto collision en-route	17	20
Knife wound while gutting	19	17
Shoot self	12	10

(**NOTE**: Total does not sum 100% due to multiple responses.)

Observations: The vast majority of hunters were not concerned about becoming ill from CWD.

- Hunters in the CWD counties were no more concerned about becoming ill from CWD than were hunters that hunted outside the CWD counties.

- More hunters were concerned about getting shot by a hunter from another hunting party than becoming ill from CWD.

  Approximately one-half of all hunters (50% in the CWD counties and 47% outstate) said they were "very" or "somewhat" concerned about being shot by another party member.

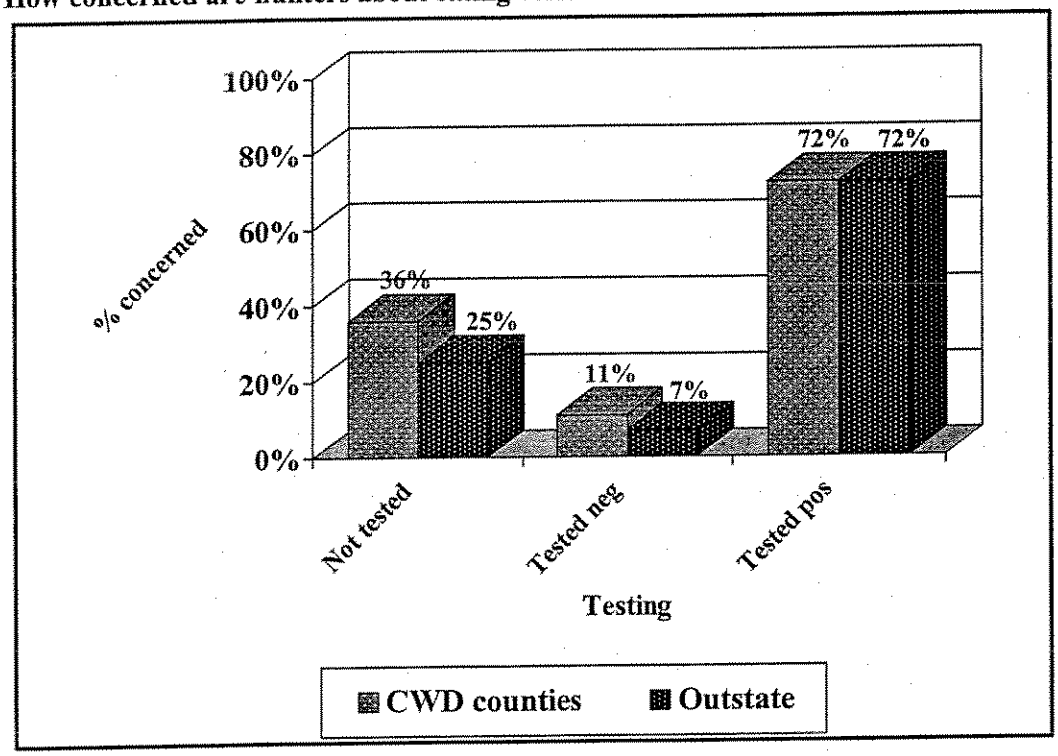
- Results also indicate that hunters were no more concerned about CWD than they were about contracting Lyme's disease. Concern over both risks was expressed by an equal percentage of hunters.

- More hunters expressed concern over becoming ill from CWD than they did for being shot by a member of their own party, falling from a tree stand, having a heart attack, having an auto collision to and from their hunting location, wounding themselves while gutting their deer, and shooting themselves.

Few hunters are concerned about eating venison if the deer tested negative for CWD.

The survey asked how concerned a hunter would be about eating wild venison from a Wisconsin deer under three testing scenarios: the venison was not tested for CWD, the venison was tested and the result was negative, and the venison was tested and the result was positive. Results indicate a negative test greatly reduces a hunter's concern.

How concerned are hunters about eating venison?



Observations: A majority of hunters would be concerned about eating venison from a wild Wisconsin deer that tested positive for CWD.

- Just over one-third (36%) of the CWD area hunters and one-fourth (25%) of the outstate hunters said they would be concerned about eating venison from a deer that was not tested for CWD.

  Approximately two-thirds (63%) of the CWD area hunters and three-fourths (73%) of the outstate hunters said they had "little" to "no concern." One to three percent, respectively, were "unsure."

- If a deer tested negative for CWD, only about one hunter in 10 would be concerned about eating the venison.

  Eighty-five percent of the CWD area hunters and 91 percent of the outstate hunters said they had "little" to "no concern." Four percent and two percent, respectively, were "unsure."

- A positive test result, however, greatly increased the percentage of hunters that would be concerned about eating the venison. Most likely they fear the disease could be transmitted to them.

  A majority of nearly three-fourths (72%) of all hunters said they would be concerned about eating venison that came from a deer that tested positive for CWD.

  One-fifth (20%) of both the CWD area hunters and the outstate hunters said they had "little" to "no concern." Eight percent of each hunter group was "unsure."

  NOTE: The questionnaire did not explain that a negative test was not an assurance of venison safety. It's possible that respondents interpreted the veterinary diagnostic test as a surrogate food safety test.

HUNTER BEHAVIOR DURING AND AFTER THE HUNT

The majority of hunters did not change their hunting behavior.

One might have expected hunters to change their hunting behavior when facing their first CWD deer hunt. Survey results, however, indicate the majority of hunters did not change where they hunted and how long they hunted. This supports the earlier finding that hunters were not very concerned about CWD as a health risk. It also supports the commitment Wisconsin deer hunters have to deer hunting.

Hunter behavior during the hunt

Item	CWD counties	Outstate
Hunted in traditional management unit	94%	94%
Change hunting time because of CWD?		
No, hunted the same as always	68%	80%
Yes, hunted more than in past years	20	10
Yes, hunted less than in past years	14	7
Yes, hunted only for a large buck	5	6

(**NOTE**: Total does not sum 100% due to multiple responses.)

Observations: Hunters did not flee the CWD area; nor did they flock to the CWD units.

- Nearly all hunters (94%) continued to hunt in their traditional hunting units.
- For most hunters, regardless of where they hunted, the time they spent in the field was the same as past deer hunts.

  Approximately two-thirds (68%) of the CWD area hunters and 80 percent of the outstate hunters said they hunted the same as always.

- Slightly more hunters said they hunted more during the 2002 gun deer hunt than said they hunted less.

  NOTE: Of the hunters that said they hunted more than in past years, 84 percent of the CWD area hunters and 56 percent of the outstate hunters hunted at least one of the additional deer seasons offered beyond the regular 9-day gun hunt.

- About one hunter in 20 (5% to 6%) changed his/her hunt by hunting only for a large buck.

Nearly all hunters that bagged a deer had the deer processed for venison.

Further evidence was found that hunters were not very concerned about CWD as a possible health risk. The vast majority of hunters that bagged a deer processed it for consumption of venison.

Hunters' response to bagging a deer

Item	CWD counties	Outstate
Percent that bagged a deer	44%	45%
What did hunters do with their deer?		
Processed for consumption	89	90
Took head to taxidermist	11	10
Donated to pantry	4	2
Disposed because of CWD concerns	4	1
Disposed because no use for venison	1	0

(**NOTE**: Total does not sum 100% due to multiple responses.)

Observations: Hunters did not give up their venison stews and chops.

- Nearly all hunters who bagged a deer had the deer processed for consumption of venison (personal and/or for friends and family).

  Hunters who bagged a deer in the CWD counties (89%) were just as likely to process the deer for its venison than were those who hunted outside the CWD area (90%).

- A negligible percentage of about one hunter in 25 (4%) in the CWD counties disposed of his/her deer because of concerns about CWD.

A minority of hunters submitted a deer head for CWD testing.

Prior to the 9-day gun deer hunt, the Department received a great amount of input from hunters explaining that a CWD test was essential for their continued hunting participation; without a CWD test, they may not hunt and their spouses would not allow them to bring venison into their homes. Given that, it's somewhat surprising that more hunters did not take advantage of the testing opportunities.

Hunters' participation in CWD testing opportunities

Item	CWD counties	Outstate
Submitted head for testing (TOTAL)	32%	13%
DNR sampling process	31	12
Private lab testing kit	1	1
Veterinarian testing	0	0
Why hunters did not submit a deer head		
CWD is not a health risk	46%	34%
Trust own butchering skills	34	31
Did not hunt in CWD area	0	58
Other reasons	< 10%	<10%

(**NOTE**: Total does not sum 100% due to multiple responses.)

Observations: Hunters in the CWD counties were more likely than hunters outstate to have their deer tested for CWD.

- About one-third (32%) of the CWD area hunters compared to 13 percent of the outstate hunters submitted a deer head for testing.

  A private lab testing kit and veterinarians were not widely used as avenues for CWD testing.

- The questionnaire presented nine possible reasons why a hunter may have chosen not to submit a deer head for testing. The primary reasons for not submitting a head were that hunters did not believe CWD was a risk to their health and they trusted their own butchering. In addition outstate hunters did not submit a head for testing because they did not hunt in known CWD counties and therefore, believed they were not at risk.

- No other response explained more than nine percent of the reasons why hunters did not submit a head for testing. These other reasons included the hunter: had no intentions of using the venison, did not want to take the time to drop off the head, did not want to drive out of the way to drop off the head, thought the test notification took too long, had planned to mount the head, and the hunter thought the test was too costly.

  NOTE: The opportunities to have a deer sampled in outstate counties were less likely than in CWD counties. Sampling intensity in the CWD counties was higher than in outstate counties. The Department's goal in the Management Zone was to sample 500 deer per deer management unit; the goal outstate was 500 deer per county and some counties were pooled.

HUNTER SUPPORT FOR OR OPPOSITION TO DNR CONTROL MEASURES

Hunters endorsed further monitoring of the deer herd more so than any other proposed control measure.

This section looks at various measures being considered to control the spread of chronic wasting disease. It answers which measures hunters most supported, which measures they were most opposed to, and their levels of support for statewide bans on deer baiting and the recreational feeding of deer.

Hunters' support for five possible control measures

Control measure	CWD counties			Outstate		
	Support	Oppose	Unsure	Support	Oppose	Unsure
Eradicate deer in EZ	45%	37	18	53%	28	19
Reduce herd below population goals in MZ	42%	41	16	50%	27	22
Reduce herd in EZ – don't kill all the deer	58%	23	19	48%	28	24
Further monitoring – wait for completed test results	68%	20	13	68%	21	11
Do nothing – let nature take its course	36%	45	19	27%	58	15

Observations: More hunters, in both the CWD counties and the outstate counties, endorsed further monitoring the deer herd and waiting for test results, than any other control measure.

- Approximately two-thirds (68%) of all hunters thought the DNR should continue to monitor the deer herd before proceeding with disease control measures.

- A majority of 58 percent of the CWD hunters and just under one-half (48%) of the outstate hunters supported a reduction of the herd in the Eradication Zone without killing all of the deer.

  NOTE: More hunters supported eradicating the deer in the Eradication Zone, reducing the herd below population goals in the Management Zone, and reducing the herd in the Eradication Zone without killing all of the deer than those who opposed the three measures.

- Doing nothing and letting "nature take its course" was supported by a minority of just over one-third (36%) of the CWD area hunters and just over one-fourth (27%) of the outstate hunters.

  NOTE: More hunters oppose than support the idea of doing nothing to control CWD.

A single control measure was not endorsed by a majority of hunters.

When asked to elect a single measure to help control the spread of chronic wasting disease, hunters were divided on which measure they most preferred. Control measures that they opposed, however, were fairly clear.

Hunters' most favored and most opposed control measures

Control measure	CWD counties		Outstate	
	Favored	Opposed	Favored	Opposed
Eradicate deer in EZ	20%	46%	28%	37%
Reduce herd below population goals in MZ	14	6	16	1
Reduce herd in EZ – don't kill all the deer	20	1	18	1
Further monitoring – wait for completed test results	36	2	29	2
Do nothing – let nature take its course	10	45	10	59

Observations: Survey results were unable to provide the Department with a clear direction.

Among the CWD area hunters:

- Additional monitoring of the deer herd was most favored (though not by a majority); 36 percent thought the Department should wait until all test results were completed.
- Eradicating the deer herd in the Eradication Zone as well as reducing but not killing all the deer in the Eradication Zone were each favored by one in five hunters (20%).
- Reducing the herd below population goals in the Management Zone and doing nothing at all were each favored by less than one hunter in five.

Among the outstate hunters:

- Additional monitoring of the deer herd and eradicating the herd in the Eradication Zone were most favored (though not by a majority); 29 percent thought the Department should wait until all test results were completed and 28 percent thought the herd should be eradicated.
- Reducing but not killing all the deer in the Eradication Zone, reducing the herd below population goals in the Management Zone, and doing nothing at all were each favored by less than one hunter in five (20%).

Hunters were most opposed to:

- Doing nothing at all and eradicating all the deer in the Eradication Zone. Over 90 percent of each hunter group opposed the two measures combined.

  Forty-five percent of the CWD area hunters and nearly three-fifths (59%) of the outstate hunters were most opposed to doing nothing at all.

  Almost one-half (46%) of the CWD area hunters and more than one-third (37%) of the outstate hunters were most opposed to eradicating the herd in the Eradication Zone.

It should be noted that hunters in both the CWD counties and the outstate counties had little confidence that the three hunting control measures would stop the spread of chronic wasting disease. For the three control measures, the respondents were asked how confident they were that each measure would stop the disease from spreading throughout Wisconsin.

Hunters' confidence in three of the possible control measures stopping the spread of CWD

Control measure	CWD counties			Outstate		
	Confident	Not confident	Unsure	Confident	Not confident	Unsure
Eradicate deer in EZ	18%	56	26	25%	45	30
Reduce herd below population goals in MZ	15%	57	28	24%	43	33
Reduce herd in EZ – don't kill all the deer	22%	53	25	22%	42	36

The table above identifies that:

- One-fifth (22%) or fewer of the CWD area hunters were confident that the proposed control measures would stop the spread of CWD; about one-fourth (22% to 25%) of the outstate hunters had confidence in the control measures.

- More than one-half (53% to 57%) of the CWD area hunters had "little" to "no confidence" that the proposed control measures would stop the spread of CWD; slightly more than two-fifths (42% to 45%) of the outstate hunters had "little" to "no confidence" in the control measures.

- One-fourth or more (25% to 28%) of the CWD area hunters and approximately one-third (30% to 36%) of the outstate hunters were "unsure" about how effective each control measure would be at stopping the spread of CWD.

As an alternative control measure, hunters would like to be paid for their role in disease control.

The questionnaire explained that if hunting alone did not reduce the herd in the Eradication Zone, the state may need to consider disease control measures beyond hunting seasons and landowner permits.

Hunters' support for alternative control measures

Control measure	CWD counties			Outstate		
	Support	Oppose	Unsure	Support	Oppose	Unsure
Sharpshooters shooting over bait	40%	55	5	51%	42	7
Sharpshooters not shooting over bait	42%	51	7	50%	41	9
Use helicopters to drive deer	33%	60	7	39%	51	10
Pay hunters for deer shot	59%	33	8	56%	35	9

(**NOTE:** County of residence rather than deer management unit hunted was used for analysis.)

Observations: Hunters offered their greatest support for being paid for their role in disease control efforts.

- More than one-half (56%) of outstate residents and 59 percent of CWD area residents supported the idea of paying hunters for deer they shot.
- Hunters offered significantly less support for other alternative control measures.

  Hunters residing in the CWD counties responded with greater opposition than support for the use of sharpshooters.

  This was not the case for outstate resident hunters; more hunters supported than opposed the use of sharpshooters.

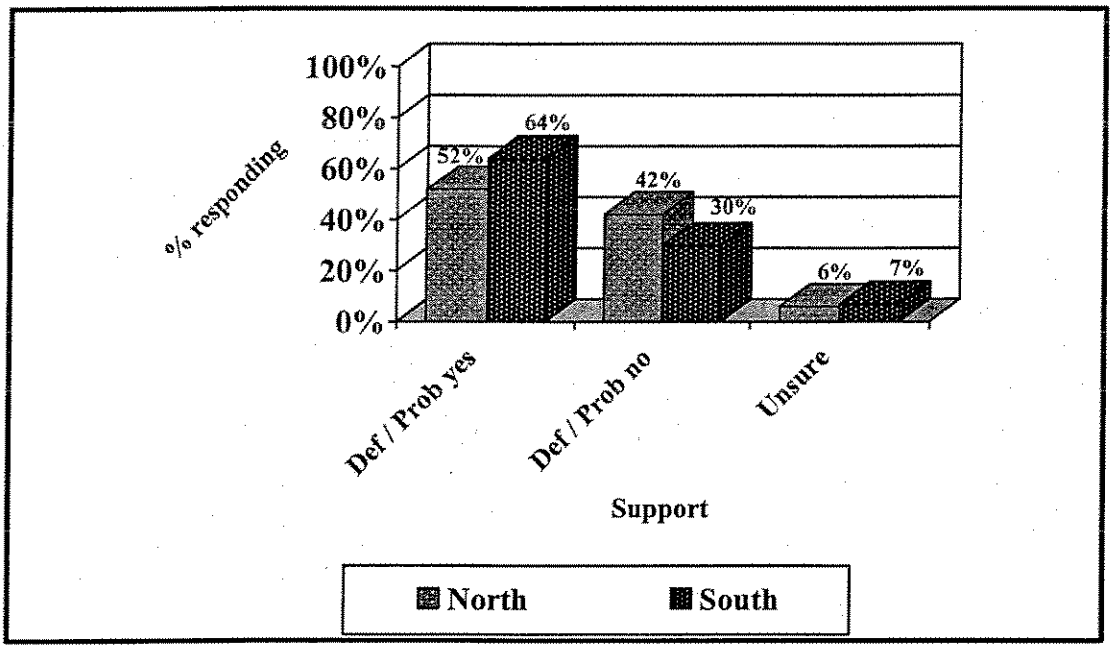
  NOTE: Taking bait out of the sharpshooter scenario made little difference in a hunter's level of support.

- Hunters voiced the greatest opposition to using helicopters to drive deer; three-fifths (60%) of the CWD area residents and approximately one-half (51%) of the outstate residents opposed the use of helicopters.

There was moderate support for a statewide ban on deer baiting.

Perhaps the most controversial control measure was the statewide ban on deer baiting. To gauge the hunters' level of support for the ban, the questionnaire asked if the respondent believed "...that baiting for deer hunting purposes should be banned statewide?" More hunters in the south supported the ban than did hunters in the north.

Hunters' support for a statewide ban on deer baiting



(**NOTE 1**: These results are applicable to the statewide random sample of gun deer hunters. They include hunters that reside in the CWD counties but do not include the 600-oversample of CWD county residents.)

Observations: There is support, though not overwhelming, for a statewide ban on deer baiting.

- In the north, more hunters supported a statewide ban on deer baiting than opposed the ban.

  Just over one-half (52%) of hunters residing in the north supported a statewide ban on deer baiting.

  Two of five hunters (42%) from the north opposed a statewide ban.

- There is stronger support in the south for a statewide ban on deer baiting.

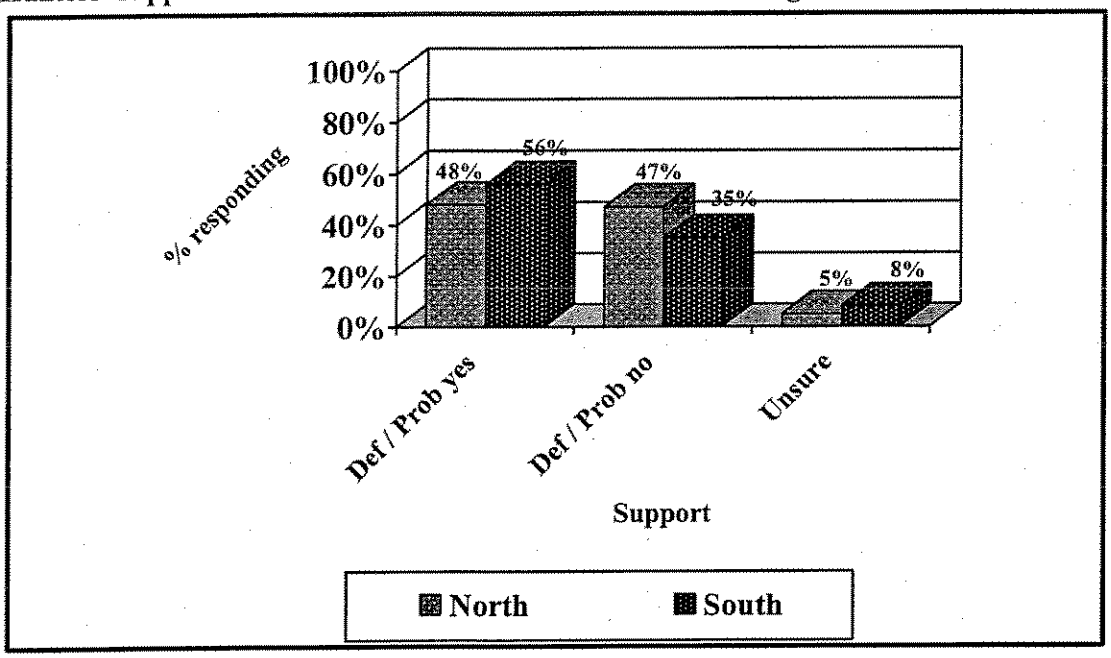
  A majority of nearly two-thirds (64%) of hunters from the south supported a statewide ban on deer baiting.

NOTE: The baiting ban affected a majority of hunters from the north. Nearly two-thirds (63%) said the ban affected their hunt in some way; 42 percent said they saw fewer deer. In the south, 29 percent said they saw fewer deer.

Hunters from the south were more likely than hunters from the north to support a statewide ban on the recreational feeding of deer.

Similar to the statewide ban on deer baiting, the ban on recreational feeding of deer was very controversial. To gauge the hunters' level of support for the ban, the questionnaire asked if the respondent believed "...there should be a statewide ban on the recreational feeding of deer?" As with the baiting ban, more hunters in the south supported the ban than did hunters in the north.

Hunters' support for a statewide ban on the recreational feeding of deer



(**NOTE 1**: These results are applicable to the statewide random sample of gun deer hunters. They include hunters that reside in the CWD counties but do not include the 600-oversample of CWD county residents.)

Observations: Hunters from the north were less likely than hunters from the south to support a statewide deer feeding ban.

- Hunters in the north are equally divided in support or opposition to a statewide deer feeding ban.

  Fewer than one-half of hunters from the north supported the ban (48%); a nearly equal percentage (47%) opposed the ban.

- A small majority of hunters from the south supported a statewide ban on recreational deer feeding.

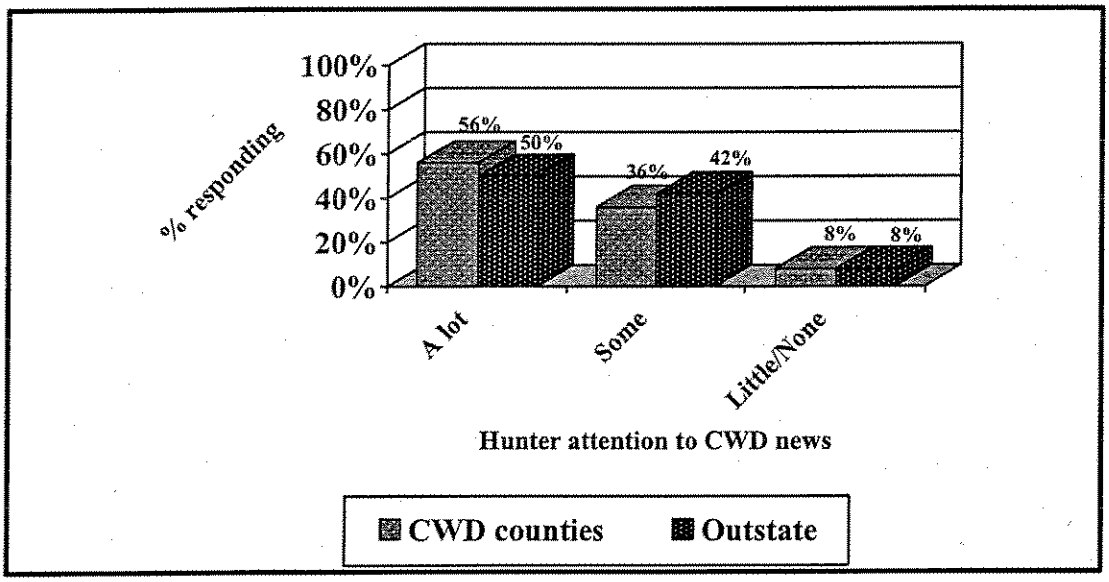
  More than one-half (56%) of hunters from the south support the ban; just over one-third (35%) of hunters from the south opposed the ban.

HUNTER AWARENESS OF CWD AND DEPARTMENT CREDIBILITY

One-half or more of the hunters said they paid "a lot" of attention to news about chronic wasting disease.

This section presents an evaluation of the Department's handling of chronic wasting disease. It first looks at how closely hunters followed CWD in the news. The section then presents the hunters' evaluations of how much attention the Department has given the disease, the credibility of information provided by the Department, and an overall evaluation of how well the Department has managed the problem.

Extent that hunters followed news about CWD



Observations: Hunters in the CWD counties were slightly more likely than hunters outstate to say they paid "a lot" of attention to CWD in the news.

- Fifty-six percent of the CWD area hunters and exactly one-half (50%) of the outstate hunters said they paid "a lot" of attention to CWD in the news.

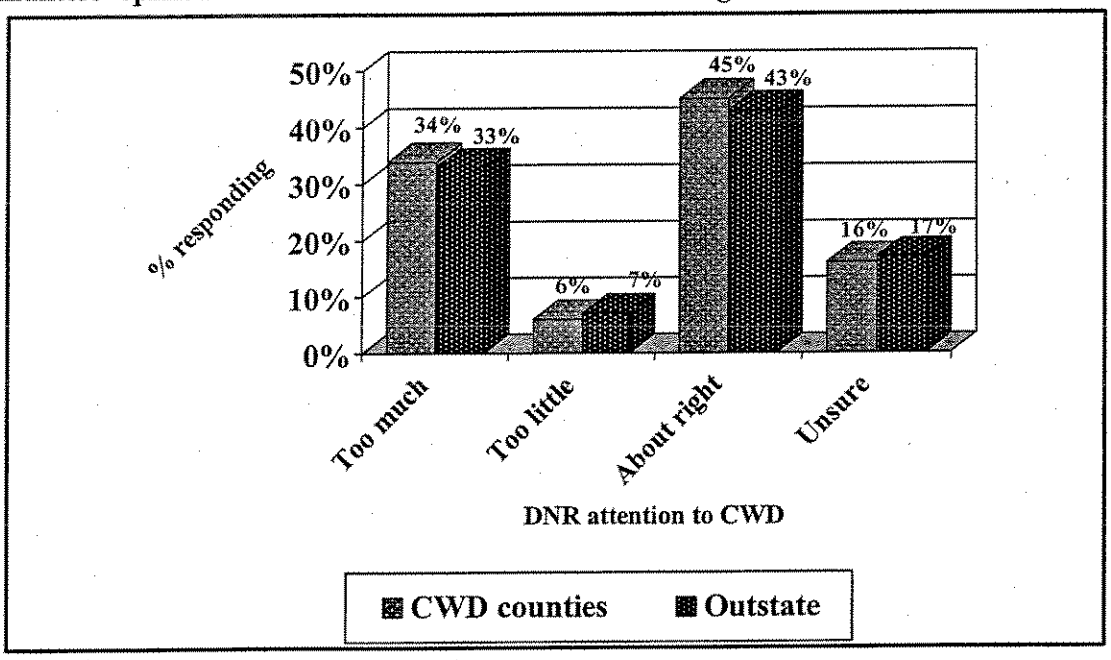
- Less than one hunter in 10 (8%) said they paid "little" or "no attention" to CWD in the news.

  NOTE: There was no substantive difference in the extent to which hunters in the north and hunters in the south followed news about CWD.

Hunters in the CWD area and the outstate area agreed on the amount of attention given by the DNR to chronic wasting disease.

The chart below presents the hunters' evaluation of how much attention the Department has devoted to chronic wasting disease.

Hunters' opinion about the amount of attention DNR has given to CWD



Observations: Outstate hunters voiced similar opinions as hunters in the CWD area regarding the amount of attention the DNR was giving CWD.

- Slightly more than two-fifths (40%) of both hunter samples thought the amount of attention the DNR was devoting to CWD was "about right."
- One-third (33%) of both hunter samples thought the DNR was giving CWD "too much attention."
- Less than 10 percent of the hunters thought CWD should receive more attention from the DNR.

  NOTE: Hunters in the north more so than hunters in the south believed CWD was receiving "too much attention;" 38 percent of the north hunters and 29 percent of the south hunters said the DNR was giving CWD "too much attention."

A majority of hunters said the DNR has provided truthful information about CWD.

Once CWD was found in Wisconsin, the Department attempted to keep the public up to date with the science of managing the disease. The questionnaire allowed hunters to evaluate the Department's communication efforts and its management decisions.

Hunters' opinions of information provided by DNR

	CWD counties			Outstate		
Statement	**Agree**	**Disagree**	**Unsure**	**Agree**	**Disagree**	**Unsure**
Information on CWD provided by DNR is believable	61%	17	22	65%	15	20
DNR provided enough information to me to make decisions on what actions to take regarding CWD	60%	25	15	64%	19	17
DNR can be trusted to provide the best available information on CWD in Wisconsin	49%	27	24	54%	23	23
DNR can be trusted to make good deer management decisions regarding CWD issues in Wisconsin	43%	33	24	46%	28	26
DNR provided adequate opportunities to listen to hunters' concerns and opinions related to CWD	63%	15	22	57%	18	25

Observations: In general, a majority of all hunters agreed that the DNR provided truthful information about CWD; fewer hunters, however, trusted the DNR to make good deer management decisions.

- A majority of 60 percent or more for each hunter sample agreed that information provided by the DNR was believable and that the DNR provided enough information for hunters to make sound decisions on what actions to take regarding CWD.

- Approximately one-half of the CWD area hunters (49%) and the outstate hunters (54%) agreed that the DNR could be trusted to provide the best available information on CWD.

- Approximately three-fifths of the CWD area hunters (63%) and the outstate hunters (57%) agreed that the DNR provided adequate opportunities to listen to their concerns and opinions about CWD.

- More hunters said they trusted the DNR to make good management decisions than said they did not trust the DNR. Forty-three percent of the CWD area hunters and 46 percent of the outstate hunters trusted the DNR to make good deer management decisions regarding CWD, compared to 33 percent and 28 percent respectively, that did not trust the DNR.

  NOTE: Substantive and statistical differences between north hunters and south hunters were not found.

Hunters question the information about the human safety of CWD and the DNR's deer management strategies.

The table below answers the question of how believable was the information provided by the DNR.

Do hunters believe information provided by DNR?

Control measure	CWD counties			Outstate		
	Believable	Not believable	Unsure	Believable	Not believable	Unsure
Biological information about CWD	69%	10	21	69%	10	21
Information about human safety concerning CWD in deer	49%	19	32	52%	15	33
Information about deer management strategies due to CWD	51%	19	29	53%	18	29

Observations: Hunters believe the biological information about CWD provided by the DNR; they have less faith in information about the human safety of CWD and deer management strategies.

- Nearly seven in 10 hunters (69%) believed the Department's biological information about CWD.
- Hunters were less certain about the DNR's information about human safety of CWD; about one-half (49% to 52%) of all hunters believed the Department's information.

  It's possible the large "unsure" response from all hunters (33%) underscores the many questions about CWD that scientists are still trying to answer.

- Likewise, about one-half (51% to 53%) of all hunters believed the Department's information about deer management strategies due to CWD.

  Nearly 30 percent of all hunters are still uncertain if they should believe the DNR.

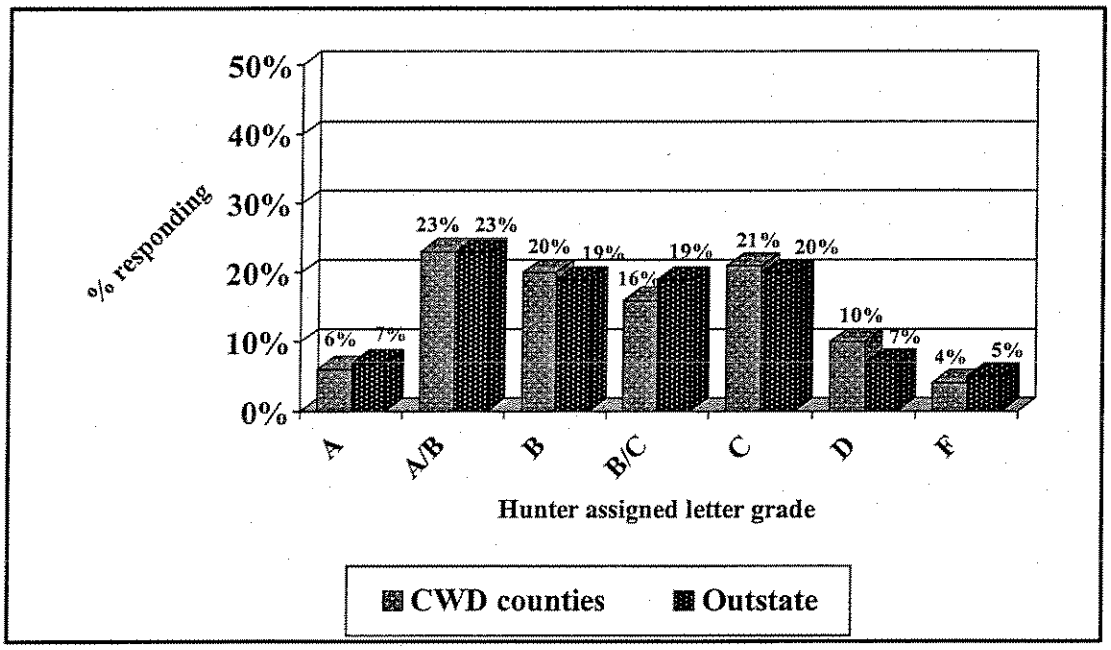
  NOTE 1: With one exception, hunters in the north and in the south expressed similar levels of belief to each other and to hunters in the CWD and outstate areas. Hunters in the north were statistically more likely to believe information about human safety of CWD than were hunters in the south; 57 percent and 51 percent, respectively, believed the DNR.

  NOTE 2: The Department of Natural Resources did not author all of the public information. Rather, the Department acted as a conduit for information developed by other state agencies.

Hunters gave the Department a "B/C" grade for the job it's done handling CWD.

Lastly, the questionnaire provided an opportunity for hunters to grade the Department's efforts in managing chronic wasting disease.

Hunters grade the DNR for the job it's done handling CWD



Observations: The DNR's job evaluation did not differ by hunting location; similar grades were offered regardless of where a person hunted.

- Nearly one-half (49%) of the CWD area hunters and outstate hunters offered the DNR a "B" grade or higher for the job it was doing handling CWD.
- Approximately one-fifth (20%) of each hunter sample thought the DNR was only doing a "C" job handling CWD.
- Fourteen percent of the CWD area hunters and 12 percent of the outstate hunters thought the DNR was doing a poor or failing job of handling CWD.
- On a standard 4-point grade scale where an "A" equals four and an "F" fails, the mean scores were equivalent to a "B/C"; the CWD area hunters provided a score of 2.5 and the outstate hunters provide a score of 2.6.

  NOTE: Hunters in the north provided a score of 2.5 and those in the south provided a score of 2.6, both equivalent to a "B/C".

RESPONDENT BACKGROUND

CWD area hunters and outstate hunters have similar background characteristics.

This section is intended to help the reader understand who responded to the survey. It identifies eight characteristics that describe who hunted the CWD area and the outstate area.

Characteristics of CWD area and outstate hunters

Hunter characteristic	CWD area hunters	Outstate hunters
Mean years of gun deer hunting	28 years	29 years
Commitment to hunting		
Miss it more than most/all other activities	74%	76%
Substitutes for hunting		
Few to no substitutes	50%	52%
Never hunted with bait	84%	61%
Own more than 50 acres	28%	23%
Full or part-time farmer	27%	17%
Mean age	45 years	46 years
Percent male	95%	95%

Observations: Hunters in the CWD area and the outstate area have similar background characteristics. They differ in their history of hunting with bait and their experience with farming.

- Each hunter group had nearly 30 years of experience of hunting deer with a gun in Wisconsin.

- Both groups were highly committed to deer hunting; approximately three-fourths (75%) said if they could no longer gun deer hunt, they would "miss it more than most" or "all of their other activities."

  NOTE: Non-hunters had statistically lower levels of commitment. Thirty-eight percent of the non-hunters said they would miss hunting "more than most" or "all of their other activities."

- Further, one-half (50%) of the hunters said if they could no longer deer hunt they had "few" to "no substitute" activities they enjoyed as much as deer hunting.

- Baiting among the CWD hunters is less prevalent than baiting among the outstate hunters.

  More than eight in 10 (84%) CWD area hunters said they never hunted with bait; about three-fifths (61%) of the outstate hunters have never hunted with bait.

  NOTE: As expected, more hunters in the north hunt with bait than do hunters in the south. Nearly one-half (49%) of north hunters compared to over one-third (36%) of south hunters have hunted deer using bait.

- Approximately one-fourth (28% of the CWD area hunters and 23% of the outstate hunters) owned more than 50 acres of land.

- CWD area hunters were more likely than outstate hunters to be involved with farming.

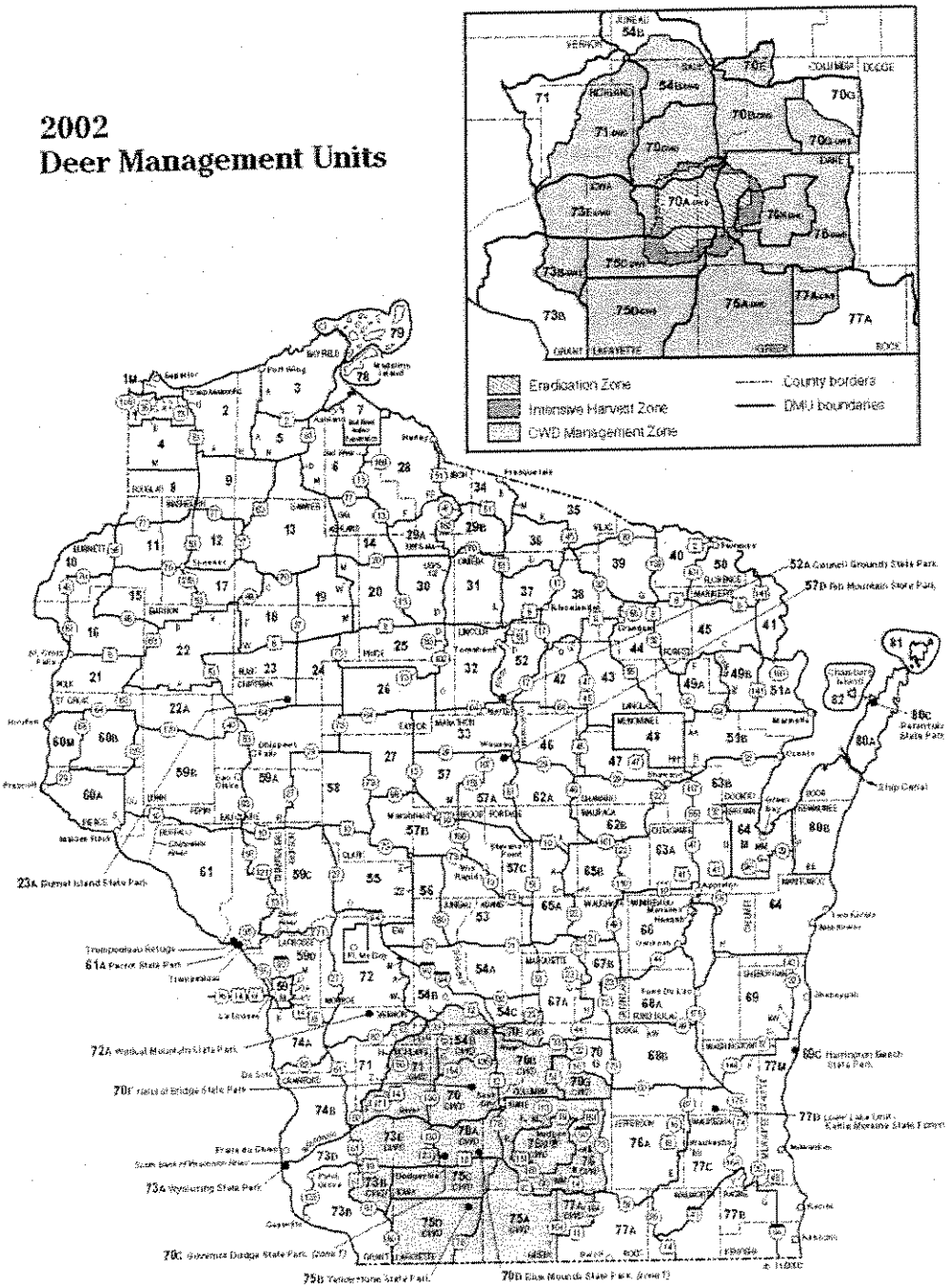
  Over one-fourth (27%) of the CWD area hunters compared to 17 percent of the outstate hunters were full or part-time farmers.

- The mean age for each hunter group was in the mid-40's.

- Hunting remains a highly male-dominated activity; 95 percent of each hunter group was comprised of males.

APPENDIX A: 2002 DEER MANAGEMENT UNITS

CWD area (shaded) and outstate area (not shaded)



APPENDIX B: LIKELIHOOD OF HUNTERS TAKING VARIOUS ACTIONS UNDER THREE DIFFERENT SCENARIOS

Scenario 1: CWD in the hunter's unit has been **DETECTED;** a USDA certified test for CWD is **AVAILABLE**; baiting in the hunter's unit is **LEGAL**

Scenario 2: CWD in the hunter's unit has been **DETECTED**; a USDA certified test for CWD is **AVAILABLE**; baiting in the hunter's unit is **NOT LEGAL**

Scenario 3: CWD in the hunter's unit has been **DETECTED**; a USDA certified test for CWD is **NOT AVAILABLE**; baiting in the hunter's unit is **NOT LEGAL**

(**NOTE 1:** Results are only for hunters that hunted in non-CWD counties; those that have not experienced a CWD-county hunt.)

(**NOTE 2:** Detected was defined as at least one deer in the management unit tested positive for CWD.)

Scenario 1

	How likely or unlikely is it for you to take the following actions?		
Response	Continue to hunt in my unit in 2003	Continue to hunt but switch to new unit in 2003	Give up deer hunting for 2003 season
Likely	**84%**	**12%**	**5%**
Unlikley	8	77	89
Unsure	8	10	6

Scenario 2

	How likely or unlikely is it for you to take the following actions?		
Response	Continue to hunt in my unit in 2003	Continue to hunt but switch to new unit in 2003	Give up deer hunting for 2003 season
Likely	**84%**	**13%**	**6%**
Unlikley	8	77	86
Unsure	8	10	8

Scenario 3

	How likely or unlikely is it for you to take the following actions?		
Response	Continue to hunt in my unit in 2003	Continue to hunt but switch to new unit in 2003	Give up deer hunting for 2003 season
Likely	**70%**	**17%**	**9%**
Unlikley	16	70	82
Unsure	14	13	10

APPENDIX C: MOST IMPORTANT REASONS FOR NOT GUN DEER HUNTING IN 2002

Why hunters chose not to hunt the 2002 gun deer season

The table on the following page identifies the most important reasons why a hunter did not hunt the 2002 gun deer season.

Observations: Hunters elected not to hunt the 2002 gun deer season for a variety of reasons. A single category does not explain why hunters chose not to hunt.

- Concerns about CWD and the safety of venison explained why about one-third (32%) of the hunters skipped the 2002 gun season.

  Approximately one hunter in five (22%) did not hunt because of CWD concerns.

  Less than one hunter in 10 (7%) did not hunt because s/he did not want to participate in a deer hunt where the venison could not be consumed (hunter's assessment).

  Spousal concern about venison safety (3%) was an insignificant reason for not hunting (although this was frequently mentioned prior to the hunt by hunters and their spouses).

- Conflicting responsibilities and not enough time explained why one-fourth (24%) did not hunt. These reasons were typical of any deer season; in other words, regardless of season peculiarities, they would be common explanations for non-hunting.

  Approximately one hunter in 10 (12%) indicated they had conflicting responsibilities; an equal percentage said they did not have enough available time.

- Approximately one hunter in 10 (11%) did not hunt because of poor health and because s/he was too old.

- Not having anyone to hunt with explained why just over one hunter in 20 (6%) did not hunt.

- An equal percentage (6%) of hunters skipped the 2002 gun deer season because they disagreed with the Department's management approach.

  NOTE: Given the controversial nature of the baiting ban, it is important to note that the ban had a negligible affect on hunter participation. One non-hunter out of 100 (1%) did not hunt because of the statewide ban on baiting.

- Approximately one-fifth (21%) had other reasons for not hunting including not purchasing a license (4%), not having land to hunt on (3%), and various unique write-in reasons (14%).

The most important reason for not gun deer hunting in 2002

Reason	Percent responding
Concerns about CWD (TOTAL)	**32%**
I have concerns about CWD and the safety of venison	22
I do not believe in hunting only for killing – where I can't eat the meat	7
My spouse/partner has concerns about CWD and the safety of venison	3
Scheduling and conflicts (TOTAL)	**24**
I had conflicting responsibilities or activities	12
I did not have enough available time	12
Health and age (TOTAL)	**11**
Health reasons prevented me from hunting	8
I'm getting too old	3
Lack of hunting partners (TOTAL)	**6**
My hunting partners chose not to hunt	4
I couldn't find anyone to hunt with	2
Disagree with DNR deer management (TOTAL)	**6**
I disagree with the DNR management approach to CWD and did not hunt as a personal protest	4
I hunt with bait and baiting is now illegal	1
There aren't enough deer where I traditionally hunt	1
Other reasons (TOTAL)	**21**
I did not buy a license	4
I did not have any land to hunt on	3
Various unique write-in reasons	14

NOTE: Statistical differences between CWD area residents and outstate residents were not found for reasons for not hunting in 2002.

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February 14, 2003

Chronic Wasting Disease and the Science in support of the Ban on Baiting and Feeding Deer.

Timothy R. Van Deelen Ph.D.
Wisconsin DNR Research

Summary

Reliable science provides support for a ban of baiting and feeding of white-tailed deer to reduce disease risks for Chronic Wasting Disease (CWD). Peer-reviewed research papers published in reputable scientific journals indicate the following:

- **CWD is transmitted laterally (live diseased deer infect other deer)**
- **Deer can get CWD by ingesting something contaminated with the disease prion**
- **CWD prions may be shed in feces and saliva**
- **Disease course and symptoms indicate high potential for transmission where deer are concentrated**
- **Evidence from captive situations indicates that deer can get CWD from highly contaminated environments.**
- **Baiting and Feeding causes *unnatural* concentration of deer**
- **Reduction of contact through a ban on baiting and feeding is likely very important to eradicating or containing a CWD outbreak.**
- **Baiting and feeding continues to put Wisconsin's deer herd at risk to other serious diseases**

In addition, experts in CWD, wildlife disease and deer nutrition support bans on baiting and feeding as part of a comprehensive strategy to prevent and/or manage CWD.

Under a baiting and feeding ban, disease outbreaks are more likely to be smaller in scale and more apt to be contained or eliminated. With the long CWD incubation period and other factors that make discovery of a new outbreak difficult, an outbreak that is already widespread when detected because of baiting and feeding may not be able to be contained or eliminated.

This document provides details and explicit links to the supporting science.

Chronic Wasting Disease and the Science behind the Ban on Baiting and Feeding Deer.

Some critics claim that there is no scientific support for the judgment that resulted in the ban. **This is simply untrue.** In this document, I review some of the scientific evidence in support of the baiting and feeding ban.

The science in support of the ban on baiting and feeding is strong and comes from a number of diverse scientific sub-disciplines (veterinary medicine, wildlife ecology, biochemistry, physiology, etc.). Consequently, there is no single comprehensive study or paper that, by itself, demonstrates the CWD-related effects of baiting and feeding of wild deer (good or bad). Evaluating the science relative to baiting and feeding requires integration of scientific evidence from several different sub-disciplines.

The **quality of scientific evidence** is an issue for some critics who claim that other science or other experts fail to support the ban. It is also an issue in trying to reach an objective scientific judgment. In keeping with established scientific practice, I consider articles published in reputable, peer-reviewed, scientific literature to be of the highest quality. Peer-review insures that articles have been rigorously evaluated and endorsed by qualified specialists. A secondary level of scientific rigor is the unpublished opinion or unpublished research of recognized experts working on the topic of interest. An example of this would be the opinion or unpublished research on CWD transmission from investigators who have established their expertise through peer-reviewed publication on other CWD-related topics. A very distant third level of quality is the unpublished opinion of recognized experts working on distantly related topics. Again, scientific expertise is demonstrated by frequent publication in reputable peer-reviewed scientific journals.

The following is a partial list of scientific evidence that suggests that baiting and feeding of wild deer elevates the risk of CWD transmission. This list focuses almost entirely on disease risks posed by CWD **although other diseases (e.g. Bovine Tuberculosis) may pose even greater risks** and there are many other reasons (e.g. ecological, social, nutritional) why baiting and feeding deer is inappropriate management. **This list is intended to be explicit in its links to peer-reviewed science.** Complete literature citations are included at the end of the document for readers who want to read the original scientific articles.

- **CWD is transmitted laterally (live diseased deer infect other deer)**

Researchers who have studied CWD epidemics in both captive and free-ranging deer populations have determined that CWD is both contagious and self-sustaining (meaning that new infections occur fast enough for CWD to persist or increase over time despite the more rapid deaths of the diseased individuals; Miller et al 1998, 2000). Supporting evidence comes from observational data (Williams and Young 1992; Miller et al. 1998, 2000) experimental data, and epidemiological models fit to observed prevalences in free-living deer (Miller et al. 2000, Gross and Miller 2001, M. W. Miller unpublished in Williams et al. 2002). These studies suggest that observed prevalences and rates of spread of CWD in real populations could not occur without lateral transmission. For example, maternal transmission (doe to fawn) if it occurs, is rare and cannot explain most cases where epidemiologic data are available(Miller et al. 1998, 2000). Similarly, indirect lateral transmisson (e.g. from a contaminated environment) may require unusually high levels of contamination (see below; Williams et al. 2002). Nonetheless, emerging research from Colorado suggests that indirect lateral transmission from environmental contamination appears to play a role in sustained and recurrent epidemics (Miller 2002).

- **Deer can get CWD by ingesting something contaminated with the disease prion**

Six mule deer fawns were fed a daily dose of 2g (0.07 ounces) of brain tissue from CWD-positive mule deer in a tightly controlled experiment for 5 days. Another three were fed the same doses using brain tissue from CWD-negative mule deer. All deer were held separately in indoor pens that had never

before held deer. The fawns were then killed and necropsied at specific intervals 10 to 80 days post-inoculation. At 42 days and later post inoculation, all fawns dosed with CWD-positive tissue tested positive for CWD prions in lymph tissues associated with their digestive tracts (Sigurdson et al. 1999). Other transmissible spongiform encephalopathies (TSEs; Kuru, transmissible mink encephalopathy, bovine spongiform encephalopathy[BSE]) appear to be transmitted through ingestion of prion-infected tissue as well (Weissmann et al. 2002). Due to the human health crisis associated with eating BSE-infected beef in Europe, many other researchers working with TSEs, including CWD (Sigurdson et al 1999, 2001), have traced the movements of infectious prions of orally-infected animals through the lymph tissue embedded in the intestinal lining, into nervous tissues associated with the digestive tract (e.g. Maignien et al 1999, Beekes and McBride 2000, Heggebo et al. 2000, Huang et al. 2002) and eventually to the brain via the nervous system (Sigurdson et al. 2001, Weissmann et al. 2002). Experimental studies using hamsters have shown that prions can infect through minor wounds in the skin (Taylor et al. 1996) and that infection through minor wounds on the tongue was more efficient than infection from ingestion (Bartz et al. 2003). These studies not only demonstrate that an oral route of infection is possible, but are beginning to provide specific details about the pathways involved in the movement of infectious prions into the central nervous system and other organs (Weissmann et al. 2002).

- **CWD prions may be shed in feces and saliva**

Following oral exposure, prions associated with many TSEs (Maignien et al 1999, Huang et al. 2002) including CWD (Sigurdson et al. 1999; Miller and Williams 2002 and Spraker et al. 2002 cited in Williams et al. 2002) both accumulate and replicate in the lymph tissues associated with the gastrointestinal tract – particularly in lymph tissues in contact with the mucosa lining the inside of the intestines (e.g. Peyer's patches, Weismann et al. 2002). In infected deer, CWD prions also accumulate in the pancreas and various other glands of the endocrine system (Sigurdson et al 2001). Experiments with hamsters demonstrated that infectious prions can travel from the brain to the tongue along tongue-associated cranial nerves (Bartz et al. 2003). During digestion, the liver, pancreas, intestinal mucosa, and other glands secrete chemicals needed for digestion (Robbins 1983) and cells lining the inner surface of the intestine continuously die and slough off providing potential physical mechanisms for prion shedding into the intestines (others are likely). This is evidence that infectious prions are likely shed in the feces and saliva (Sigurdson et al. 1999).

- **Disease course and symptoms indicate high potential for transmission where deer are concentrated**

Appearance of CWD symptoms in an infected deer lags initial exposure by a variable time period on the order of roughly12-24 months or more ([E. S. Williams and M. W. Miller unpublished; E. S. Williams, M. W. Miller, and T. J. Kreeger unpublished] cited in Williams et al. 2002). Once clinical symptoms are observed, deer enter a symptomatic phase that may last on average 1-4 months before they invariably die (Williams et al. 2002). Symptoms are initially subtle but eventually include behaviors likely to contaminate a site with bodily fluids (e.g. excess urination, excess salivation including drooling and slobbering, and uncontrollable regurgitation, Williams et al. 2002). Deposition of feces increases with concentration of deer activity. This is both obvious and intuitive and pellet group counts have been used as an index of deer density since the 1940's (Bennet et al. 1940). During winter, northern deer defecate about 22 times a day (Rogers 1987). At least one study (Shaked et al. 2001) has reported detection of an altered form of the infectious prion in the urine of hamsters, cattle, and humans with TSEs. This altered form, while not as virulent, produced sub-clinical prion infections following experimental inoculation. Shedding of infectious prions is likely progressive during the course of disease from infection to death (Williams et al. 2002). Replication and presence of infectious prions in gut-associated lymph tissue early in the incubation (Sigurdson et al. 1999, Weismann et al. 2002) and epidemiological modeling (M. W. Miller unpublished cited in Williams et al. 2002) suggest that shedding precedes the onset of symptoms in both elk and mule deer.

supplemental feeding of deer – practices that were likely crucial to the establishment of self-sustaining TB in the deer population" (O'Brein et al. 2002 and citations within).

In oral presentations given to the Texas chapter of the Society of Range Management (Oct. 6 2000) and to the Southeaster Deer Study Group (Feb. 19 2001) by Dr. Robert D. Brown, Professor and Head of the Department of Wildlife and Fisheries Sciences at Texas A&M University, Internationally recognized expert on deer and deer nutrition...
"One of the major points of this paper is the concern over transmission of disease. It amazes me that we have not done more studies in Texas on disease transmission at food plots and deer feeders, whether they be for supplementing the deer or for baiting. We know that in 1994 tuberculosis (TB) was first detected in wild deer in Michigan. It is now in a 5-county area, and has spread to carnivores and dairy herds"..."In Wyoming and around Yellowstone Park, brucellosis is wide spread among cattle, elk, and bison, the latter two species being concentrated on feeding grounds in the winter. Likewise, Chronic Wasting Disease (CWD) has now been observed in free-ranging elk and mule deer in several western states. Since CWD is passed animal to animal, concentrations caused by supplemental feeding is believed to increase the spread of the disease" (Brown Unpublished).

In a report issued by a panel of internationally recognized wildlife disease experts who reviewed Colorado's CWD management program...
"Regulations preventing...feeding and baiting of cervids should be continued" (Peterson et al. 2002).

In a comprehensive review of the ecological and human social effects of artificial feeding and baiting of wildlife prepared by the Canadian Cooperative Wildlife Health Centre, Department of Veterinary Pathology, University of Saskatchewan...
"Significant ecological effects of providing food to wildlife have been documented through observation and experimentation at the individual, population, and community levels. The increased potential for disease transmission and outbreak is perhaps of greatest and immediate concern; recent outbreaks of bovine tuberculosis and chronic wasting disease in Canada and the United States giving credence to this point. Nevertheless, even if disease is prevented, other significant ecological concerns exist" (Dunkley and Cattet 2003, p. 22).

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To insure that this document accurately reflects the scientific knowledge of prion disease, CWD, and deer biology, this document was reviewed by the following specialists (position and expertise follows each name). I thank them for their time. :

- Judd Aiken Ph.D. (Professor of animal health and biomedical sciences, UW-Madison; *prion diseases*)
- Valerius Geist Ph.D (Professor Emeritus, Department of Environmental Science, University of Calgary; *ecology behavior and management of deer*)
- Julia Langenberg DVM (Wildlife Veterinarian, Wisconsin DNR; *CWD, wildlife diseases*)
- Nohra Mateus-Pinilla DVM, Ph.D. (Research Epidemiologist, Illinois Natural History Survey, University of Illinois; *wildlife diseases, epidemiology*)
- Nancy Mathews Ph.D. (Assoc. Professor of wildlife ecology, UW-Madison; *deer ecology and behavior*)
- Keith McCaffery M.S. (Deer specialist, Wisconsin DNR, retired; *deer ecology and management*)
- Robert Rolley Ph.D. (Population Ecologist, Wisconsin DNR; *population dynamics, deer management*)

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CORRESPONDENCE/MEMORANDUM

DATE: April 15, 2003

TO: Natural Resources Board

FROM: Sean M. Strom, DNR Wildlife Toxicologist

SUBJECT: Alternative CWD Hypotheses: The Role of metals such as cadmium, copper, and manganese

Chronic wasting disease (CWD) is a nervous system disease of deer and elk that belongs to the family of diseases known as Transmissible Spongiform Encephalopathies (TSE). As the name implies, this disease is transmissible, indicating that it can be spread from one animal to another. Metal deficiencies, as well as excess levels of metals, are not transmissible from one adult animal to another. Because the current state of the science indicates that CWD is transmissible, it would not be prudent for the Department to support other minority theories.

Chronic wasting disease is both infectious and contagious, but specific details on the transmission of the disease are not well-understood (Williams et al. 2002). However, science suggests that contact between infected and non-infected animals via saliva, urine, and feces is the most likely route of transmission. Data from captive cervid studies (Williams et al. 2002) and field data from wild cervids provide strong evidence that animal-to-animal transmission is the primary form of infection in susceptible animals. In addition, the cluster-like pattern of disease in Wisconsin is strongly indicative of an infectious disease.

The following provides information regarding various alternative hypotheses involving metals and CWD.

1. Regarding the relationship between manganese and copper being a causative agent for CWD?

A hypothesis that has received attention involves the theory that high levels of manganese in conjunction with low levels of copper play a role in the onset of disease. Indeed, there has been some interesting research recently examining the relationship between cellular levels of manganese and copper with prion protein function. Although it may be possible such environmental factors play a role as a co-factor in the development of clinical disease, there are no data that supports the hypothesis that this relationship is the causative agent. Much more research needs to be done examining the potential confounding effect of manganese/copper levels and CWD.

2. Is it possible that conditions described in the Mn-Cu hypothesis exist in southern Wisconsin where CWD was found?

It is unlikely since the buffering capacity of the soil and water in southwestern Wisconsin would likely decrease the bioavailability of metals such as manganese. Furthermore, it has been suggested that pine needles make up a significant portion of the diet of deer and elk in the CWD endemic area of Colorado and these pine needles contain excessive concentrations of Mn (although there is no basis for this statement) and this exacerbates the high Mn-low Cu scenario. It is unlikely that pine needles make up a significant portion of the diet of deer in southern Wisconsin.

3. What data exists to support these theories?

Very little hard scientific evidence has been provided to support these hypotheses. No regimented lab studies have been carried out supporting these hypotheses. The majority of the data presented in publications by Mr. Mark Purdey is circumstantial in nature. In addition, much of his work examining the relationship between Mn and Cu in TSEs lacks any sort of statistical tests with regards to data analysis. Yet, statements are made classifying some areas of having excessive Mn or deficient Cu. What are these statements based on? Furthermore, in testing the theory of Mn-Cu interaction, only soil and plant tissue has been tested. There has been no analysis of tissue from elk or deer - something very important when dealing with food-chain issues such as this.

4. Cadmium Toxicity

Cadmium (Cd) is a naturally occurring metallic element that is found in trace quantities throughout the environment. Cadmium has no known biological function and is not a nutritionally required element. It has been hypothesized that CWD positive deer are actually suffering from cadmium toxicity rather than a Transmissible Spongiform Encephalopathy (TSE).

Without question, cadmium is a toxic metal that can cause serious health problems if exposed. However, incidences of acute cadmium toxicity or cadmium poisoning in wildlife are extremely, extremely rare. In fact, a search of the literature failed to produce a single occurrence of cadmium poisoning in mammalian wildlife.

Recently, liver and kidney tissue from CWD positive game farm deer were analyzed for cadmium along with other metals. Cadmium was detected in only one of the kidney samples submitted for analysis (Level of Detection 0.1 ppm) Similarly, cadmium was only detected in two liver samples (both samples detected at 0.1 ppm). However, even in the samples where cadmium was detected, the levels were just above detection and were far below the toxic concentration in mammals of 100 ppm wet wt. It is obvious after examining these data that these deer were not exposed to toxic levels of cadmium.

Cadmium concentrations have been documented in a wide variety of North American cervids including: white-tailed deer (Musante et. al., 1993, Stansley et. al, 1991, Glooschenko et al. 1988 and Crete et al., 1987), elk (Parker and Hamr, 2001), and moose (Glooschenko et al., 1988). In none of these studies do liver or kidney cadmium concentrations reach levels considered to be toxic (100 ppm wet wt. or 500 - 1000 ppm dry wt.). Parker and Hamr (2001) examined metal levels in tissues of elk living near smelters in Sudbury, Ontario. Results indicate that even though these elk were living in close proximity to an area contaminated with metals (including cadmium), liver and kidney levels did not approach the toxic concentration. A significant age dependent increase was observed in the elk but this would be expected since cadmium is accumulated and sequestered in the liver and kidney.

If deer in southwest Wisconsin were indeed succumbing to cadmium poisoning, there would have to be an acute source of such exposure. No such source has been identified or even suggested. Furthermore, if CWD was in fact cadmium poisoning (or any other metal), one would expect an extremely high number of cases in the "mineral belt" of Colorado where historic hard rock mining has resulted in numerous waste sites and tailings piles heavily contaminated with metals including cadmium. However, few cases have been found in these areas. In addition, the CWD endemic area in Colorado, where the disease is most prevalent, is in an area with few historic mining operations and relatively low levels of metals compared to other areas. This is contrary to the cadmium hypothesis.

There is no question that deer in southwestern Wisconsin have the ability to accumulate cadmium - all animals have this ability. However, it is clear from past data that it is extremely, extremely unlikely deer from the CWD zone have accumulated toxic or lethal levels of cadmium. Considering what we know about the cadmium levels in cervids, the toxic threshold concentration for cadmium, and the absence of reported cases of mammalian cadmium toxicity, we can confidently state that deer from the CWD zone are not exposed to toxic levels of cadmium.

5. Comments on Dr. Murray McBride's Review Paper

Dr. Murray McBride, a soil scientist from Cornell University authored a non peer-reviewed, unpublished review paper regarding the hypothesis of a nutritional or environmental theory of TSEs. Dr. McBride supports the suggestion that sporadic TSEs are initiated by trace metal imbalances in soil and food chains, particularly excess manganese and deficient copper. Dr. McBride suggests that CWD is caused by a micronutrient abnormality (deficient Cu or excess Mn) and this results in the formation of the abnormal prion and subsequent neurological degeneration.

The review is quite thorough such that the article explores numerous avenues associated with the disease including potential origins of the disease, neuropathology of TSEs and Cu deficiency and the transmissibility of the disease. Although the article provides intriguing arguments and even speculation regarding the role of environmental factors and CWD, it does not produce or describe any scientific evidence that would cause us to abandon the current science. It is true that there is much that we don't know about this disease and more science is needed to investigate the potential relationships between environmental factors and clinical disease. However, the best science to date strongly indicates that CWD is a prion disease that is transmissible from one animal to the other.

The article questions the transmissibility of TSEs suggesting that most disease transmission experiments actually illustrate an autoimmune response and not disease transmission. As previously mentioned in this document, the best science currently available (both field and captive studies) indicates that CWD is a prion disease that can be transmitted from one animal to another. The cluster-like pattern of disease in Wisconsin further supports the data that CWD is an infectious, transmissible disease. Until science identifies an alternative causative agent or proves that the disease is not transmissible, it would be irresponsible for the Department to deviate from the current science-based response.

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5/14/03

JT Hearing Sen/Assembly

Rule 03-016 (CWD) Mgt Rule

- This rule is to deal w/ (CWD) and no other diseases (Hanson)

- Minnesota
- WI bans if detected on the borders

DNR: Tim Andryt, Atty; Bill Vander Zouwen, Tom Hauge

RULE: Sunset Act 108

* June 2004 ends ban on feeding

DNR says "Earn a Buck" is "~~the~~ most effective" tool
Don't like

DNR has always had authority over baiting for hunting
10 GAL. for the last 10 yrs

DNR feels small bait pile as big of a deal as large piles.
DNR says they enforced the baiting rule.

Dr. Shelby, DNR Animal Health
CWD monitoring dept. for game farms

- It is clear CWD is transmissible
- Says if you put a sick deer w/ a healthy deer the deer will get CWD
- A healthy deer will get sick from an infected pen

Brain, spleen & lymph nodes → prion concentration

- Don't know how long prions survive on a bait pile. *TB about (2) weeks

wild herd — CWD less transmissible in elk than deer (1-2%)
Mule deer high (Wyoming high as 15%)

- Can kill prions w/ bleach
- Live animal test in research now. Do a biopsy of the tonsils to check.

Baiting & Feeding Ban

- Patricia Rantala (Against)
  - Feedmill, Frog River
  - Lost $5,000 last yr. because of ban

- Keith McCaffery (Favor) Rhinelander
  - doesn't even favor 2 gal. feed.

- Mark Hagedorn (Against)
  Sheel Lake Coop

- Jane Meyer, Conservation Congress (Favor)

- Eugene Mroe - Farm (Against)
  - Disabled & baits
  - Puts feed in a feeder & bleaches the ground weekly

- Luanne Prochnow (Against)
  - Limit lbs.

- Grabski - PhD in Bacteriology

- Greg Kazmierski, W.I. Deer Hunters Coalition
  Buck Rub, Delafield

References:
Beth Wm, Wyoming — expert & allows feeding in Wyoming

Puts more restrictions on hunters -

Don't like summer season, earn a buck, etc in CWD zone.

Do Social & economic impacts

TC Rate rule was O.K. (worked not limit to N. of Hwy 10)

Dave Sebrowsky — former DNR warden (Favor)

- Todd Stittleburg, Black River Falls (against)
  Copper Theory advocate